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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,250	03/30/2004	Michael A. Schultz	108524	4825

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EXAMINER	
DOUGLAS, JOHN CHRISTOPHER	

ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/813,250	SCHULTZ ET AL.	
	Examiner	Art Unit	
	JOHN C. DOUGLAS	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-8,11,23,24 and 27-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *3-8,11 and 28-31* is/are allowed.

6)☒ Claim(s) *23,24,27 and 32-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Examiner acknowledges the response filed on /2/21/2008 containing amendments to the claims and remarks. The rejection is maintained with minor adjustments:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 32-39, 41, 42, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal, Wessels (US 4354929), and Ramirez de Agudelo (US 6019887).

2. With respect to claims 32, 34, 35, 23, and 24, Tsybulevskiy discloses where a hydrocarbon stream containing sulfoxides is contacted with a zeolite adsorbent to produce a hydrocarbon stream having a reduced concentration of sulfoxides (see Tsybulevskiy, paragraphs 2 and 26). Tsybulevskiy does not disclose where the adsorbent is contacted with a desorbent to produce a desorbent containing the sulfur compounds and an adsorbent having a reduced content of the sulfur compounds, does not disclose where the adsorbent with reduced sulfur is contacted with a hydrocarbon stream containing sulfur, does not disclose a purge stream boiling lower than the desorbent, and does not disclose fractionating the desorbent containing sulfur compounds to obtain a desorbent with reduced sulfur.

However, Bal discloses desorbing sulfur compounds from an adsorbent and treating the desorbent to remove sulfur from the desorbent (see Bal, column 1, line 65 – column 2, line 8 and claim 1).

Bal discloses that the desorbent is used to regenerate the adsorbent (see Bal, column 1, lines 60-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Tsybulevskiy to include desorbing sulfur compounds from an adsorbent and treating the desorbent to remove sulfur from the desorbent in order to regenerate the adsorbent.

Also, it would have been obvious to contact the regenerated adsorbent with a hydrocarbon stream so that the adsorbent can remove sulfur from the hydrocarbon stream.

In addition, Wessels discloses the use of n-hexane as a purge to sweep out hydrocarbons from the adsorbent (see Wessels, column 1, lines 21-27).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Tsybulevskiy to include the use of n-hexane as a purge in order to sweep out hydrocarbons from the adsorbent.

Also, Ramirez discloses where a purge stream to purge an adsorbent can consist of hydrocarbons with C1-C16 carbon atoms and the desorbent can be methanol (see Ramirez, column 7, lines 11-20 and Example 9). Therefore, it would have been obvious to include where the purge is lighter than the desorbent, because such light purge is suitable for purging an adsorbent (see Ramirez, column 7, lines 11-20).

3. With respect to claims 33 and 42, Tsybulveskiy discloses desulfurizing a diesel duel with an adsorbent (see Tsybulveskiy, paragraph 16).

4. With respect to claim 36, Tsybulevskiy discloses an absorbent that has an adsorption capacity of 0.62 wt% for a sulfoxide (see Tsybulevskiy, example 11, Table 4).

5. With respect to claim 37, Tsybulevskiy discloses where the adsorption contacting step is conducted at temperatures in the range of 10to 40 degrees C and pressures in the range of 300 to 6000 kPa (3 to 60 bars) (see Tsybulevskiy, paragraph 48).

6. With respect to claim 38, Bal discloses where the desorbent is introduced at temperatures between about 27 degrees C to about 400 degree C (see Bal, column 3, lines 21-25).

7. With respect to claim 39, Bal discloses where the desorbent is toluene (see Bal, column 3, lines 46-51).

8. With respect to claim 41, Bal discloses recycling the desorbent to the desorbing step (see Bal, column 1, lines 43-53).

9. Claims 40, 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal and Wessels as applied to claim 32 above, and further in view of Rice (US 6395950).

10. With respect to claim 40, Tsybulevskiy in view of Bal disclose everything in claim 28, but do not disclose where the fractionating step is conducted in a split shell fractionation step.

Rice discloses a fractionation zone with a vertical partition (see Rice, column 18, lines 23-45).

Rice discloses that such a distillation column with a vertical partition reduces capital costs as well as utility costs when compared to a traditional distillation column (see Rice, column 16, lines 26-43).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Tsybulevskiy in view of Bal and Wessels to include a fractionation zone with a vertical partition in order to save on capital costs and utility costs.

11. With respect to claims 43 and 44, Wessels discloses where the n-hexane purge is fractionated to produce an n-hexane overhead fraction that is recycled for use as purge gas (see Wessels, column 2, lines 10-23).

12. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsybulevskiy in view of Bal, Wessels, and Rice (US 6395950). Tsybulevskiy discloses where a hydrocarbon stream containing sulfoxides is contacted with a zeolite adsorbent to produce a hydrocarbon stream having a reduced concentration of sulfoxides (see Tsybulevskiy, paragraphs 2 and 26). Tsybulevskiy does not disclose where the adsorbent is contacted with a desorbent to produce a desorbent containing the sulfur compounds and an adsorbent having a reduced content of the sulfur compounds, does not disclose where the adsorbent with reduced sulfur is contacted with a hydrocarbon stream containing sulfur, does not disclose split shell fractionation, and does not disclose fractionating the desorbent containing sulfur compounds to obtain a desorbent with reduced sulfur.

However, Bal discloses desorbing sulfur compounds from an adsorbent and treating the desorbent to remove sulfur from the desorbent (see Bal, column 1, line 65 – column 2, line 8 and claim 1).

Bal discloses that the desorbent is used to regenerate the adsorbent (see Bal, column 1, lines 60-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Tsybulevskiy to include desorbing sulfur compounds from an adsorbent and treating the desorbent to remove sulfur from the desorbent in order to regenerate the adsorbent.

Also, it would have been obvious to contact the regenerated adsorbent with a hydrocarbon stream so that the adsorbent can remove sulfur from the hydrocarbon stream.

In addition, Wessels discloses the use of n-hexane as a purge to sweep out hydrocarbons from the adsorbent (see Wessels, column 1, lines 21-27). Wessels also discloses where the n-hexane purge is fractionated to produce an n-hexane overhead fraction that is recycled for use as purge gas (see Wessels, column 2, lines 10-23).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Tsybulevskiy to include the use of n-hexane as a purge in order to sweep out hydrocarbons from the adsorbent.

Rice discloses a fractionation zone with a vertical partition (see Rice, column 18, lines 23-45).

Rice discloses that such a distillation column with a vertical partition reduces capital costs as well as utility costs when compared to a traditional distillation column (see Rice, column 16, lines 26-43).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Tsybulevskiy in view of Bal to include a fractionation zone with a vertical partition in order to save on capital costs and utility costs.

Allowable Subject Matter

13. Claims 28-31, 3-8 and 11 are allowed.

14. The following is an examiner's statement of reasons for allowance: the prior art does not disclose introducing a desorbent containing sulfur-oxidated compounds into a high sulfur, lower end zone of a split shell fractionation column and introducing an initial portion of the effluent of the stream sent to the high sulfur, lower end zone of a split shell fractionation zone comprising desorbent into a low sulfur, lower end zone of the split shell fractionation zone.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant argues that the amendment to claim 27 limits the split shell fractionator to a fractionator having "a dividing wall extending upwardly from a bottom of the fractionator" to a fraction of the height of the fractionator to achieve a common zone at

the top of the fractionator. However, the amended language does not differentiate such a fractionator form the fractionator of Rice, having a vertical partition. The amended language does not limit the fractionator to possess a common zone at the top fractionator, because the vertical partition of Rice would also extend upwardly from the bottom of the fractionator.

Applicant next argues that Ramirez disclose teaches where the purge material is heavier than the desorbent, while the claimed invention is limited to a purge that is lighter than the desorbent. However, Ramirez (as cited in the last rejection) discloses where the purge can be both lighter and heavier than the desorbent. The rejection has been modified to more accurately reflect this in view of the claims.

Applicant further argues that Tsybulevskiy and Bal teach preferences that are against the use of distillation columns, which would lessen the motivation to add the distillation based teachings of Wessels, Rice and Ramirez. However, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). The suggestion/motivation to combine the references has been provided in the rejection.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN C. DOUGLAS whose telephone number is (571)272-1087. The examiner can normally be reached on 7:30 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. C. D./
Examiner, Art Unit 1797

/Glenn A Caldarola/
Acting SPE of Art Unit 1797